ACTIVITY 3

HOW GREEN ARE WE?

This activity enables students to audit their homes, their school, and their community to evaluate steps being taken to prevent or reduce air pollution. It is related to the "Seeing the Big Picture" warm-up. Related activities include "Lifestyles and the Environment," "Designing a Clean-Air Environment," "Deciding to Clean the Air," and "Action = Savings in CO_2 and $."

CRITICAL OBJECTIVES

- Understand the importance of energy efficiency in connection with air pollution
- Communicate with families and peers about ways to more effectively contribute to cutting down on air pollution

SKILLS

- Collecting data
- Observing
- Drawing conclusions
- Making oral presentations

GUEST PRESENTERS

Guest presenters could includes an air quality engineer, economist, ecologist, or conservationist.

BACKGROUND

Air pollution has become a major problem in many areas of the United States. Even though some of this pollution comes from natural sources, such as volcanoes, forest fires, and other natural occurrences, much of it can be traced to man-made sources. Air pollution from human sources is the result of our increasing use of large quantities of fuel to produce electricity and to power automobiles, trucks, and other vehicles. Many of these air pollutants come from burning coal, oil, wood, and other fuels used to run factories, cars, and the power plants that generate heat and light for our homes.

Many air pollutants are not only harmful, but also tend to be concentrated in urban areas where industrial activity is greatest and energy use by the community is highest. Even though these areas are affected the most by pollutants, there are things that individuals and families, schools, and communities can do to reduce this effect.

Individuals and families can play a role in cutting down on air pollution by cutting electrical and fuel costs. Electrical costs can be reduced by

RELATED WARM-UP
C

REFER TO READING MATERIALS
"Air Pollution"
"Smog"
"Automobiles and Air Pollution"
"Clean Fuels"

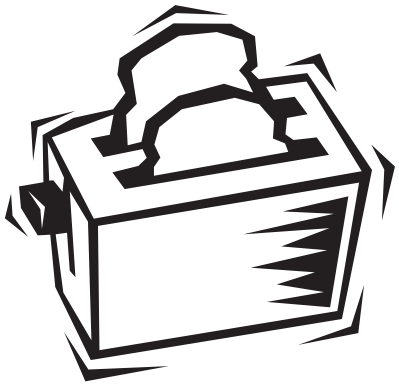
TARGET GRADE LEVEL
3rd - 6th with modifications for 7th - 12th

DURATION
Two class sessions and one week to conduct the audit

VOCABULARY
Compact fluorescent
Energy-efficiency
Incandescent

MATERIALS
Paper
Pencil
Chalk
Chalkboard

WORKSHEETS INCLUDED
5



using fluorescent or compact fluorescent bulbs in the home, adjusting the setting of the thermostat during the summer and winter, turning off appliances when they are not in use, and using alternative sources for accomplishing tasks that traditionally use electricity, such as drying clothes outdoors instead of always using the clothes dryer. Other measures can be taken, such as using sunlight instead of electricity for warmth and light, buying appliances with low wattages and favorable efficiency ratings, and keeping filters clean on furnaces, air conditioners, and refrigerators. Fuel costs can be reduced by walking or driving instead of using the car orby consolidating errands so that only one trip needs to be made to accomplish everything.

Schools also can cut down on electrical and fuel costs by taking similar measures that individuals can take in the home. Turning off lights at night, using solar energy instead of electricity to heat the homes, and keeping the temperatures at 68°F (20°C) in the winter and 77°F (25°C) in the summer are just a few measures they can take to conserve energy. In addition, they can alter bus routes to accommodate more students so that fewer buses are on the road and encourage their employees to use public transportation, walk, bike, or carpool to get to work.

Communities can help cut down on air pollution by participating in the "Green Lights" program, which is a "clean-air" effort sponsored by EPA. The program works with business and industry to help them cut down on electricity while at the same time save money. The program focuses on upgrading lighting systems and encourages the use of fluorescent and compact fluorescent light bulbs, which last ten times as long as traditional incandescent bulbs and emit more light per watt. The direct result is improved lighting and cost savings for participating businesses, as well as a reduction in air pollution. Communities also can reduce air pollution by promoting use of public transportation, designating High-Occupancy Vehicle lanes on major roads during rush-hour, improving bus routes to reach more citizens, and designating bike routes to encourage use of bikes instead of cars. This could reduce harmful emissions from cars, as well as heavy congestion on major roads.

The focus of this exercise is to learn about energy conservation practices in the home and to find out how energy efficient your students' families are. To do this, the students will compile an audit. This audit will be conducted by filling out the student worksheet on conservation practices in the home. (See reading materials on "Air Pollution," "Smog," "Automobiles and Air Pollution," and "Clean Fuels.")

WHAT TO DO

Class #1

1. Explain to students the causes of air pollution and how air pollution can be reduced through the use of energy efficient appliances and light bulbs and fuel efficient cars.

2. Introduce the exercise by telling the students that they will be conducting an audit. Explain to them that the audit will be a formal examiNation of each student's home and family practices related to energy use. Data will be collected and observations will be recorded on the student worksheets.

3. Hand out "Student Worksheet 1" with specific instructions to answer all of the questions. Explain to the class that data collected from the audit will be used as part of a future in-class discussion to assess the energy efficiency of their homes and to discuss the importance of energy conservation.

4. Give the students one week to complete the audit of their home. Be sure to tell them that they should feel free to make additional observations and to collect data related to energy use that is not necessarily on the student worksheets.

Class #2

1. Meet with the class to discuss the data collected from their audits.

2. Discuss the importance of energy conservation and how it relates to reduced air pollution. Tell students that there are many measures their families can take to conserve energy, such as purchasing new appliances that have energy efficiency ratings or setting the thermostat to 68°F (20°C) in the winter and 77°F (25°C) in the summer.

3. Explain how energy conservation measures not only reduce air pollution, but save money as well.

4. Discuss the importance of fuel conservation and how it relates to air pollution.

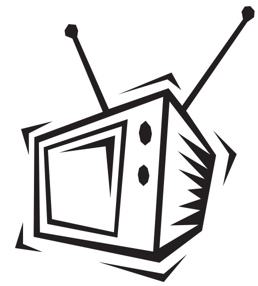
5. Discuss how car emissions contribute to the air pollution problem, but that this can be combatted by more people using public transportation, carpools, and biking or walking.

SUGGESTED EXTENSIONS (OPTIONAL)

- In addition to the extended audits, have students fill out "Student Worksheets 4 and 5," an exercise that enables students to calculate the costs of running common appliances in the home and the school. This

exercise could be used as part of a discussion of how reduced electrical costs not only save a family or a school money, but also can reduce air pollution.

SUGGESTED MODIFICATIONS



- For grades 7-9, have students conduct an audit of the school in addition to auditing their homes. Using "Student Worksheet 2," they can answer questions related to energy conservation by the school and its students and personnel.

- For grades 10-12, expand the activity to include an audit of the community. Have students use "Student Worksheet 3." This additional activity will require time to do research outside of class and includes an evaluation of energy use by industry and businesses in the community and the efforts that the community takes to encourage energy efficient practices by its citizens.

SUGGESTED READING

Gutfeld, Greg, Linda Rao, and Maureen Sangiorgio. "Pollution-Fighting Plants." *Prevention*, 44 (September 1992) p. 10.

Javna, John, et al. *50 Simple Things Kids Can Do To Save the Earth*. Andrews and McMeel (1990).

What You Can Do To Reduce Air Pollution. Washington, DC: U.S. Environmental Protection Agency EPA/450/K-92/002 (1992).

Willis, Terri, and Wallace B. Black. *Cars: An Environmental Challenge*. Children's Press (1992).

STUDENT WORKSHEET 1

HOW GREEN ARE WE?

HOME AUDIT

1. How many light bulbs do you have in your home? _____
2. How many are fluorescent or compact fluorescent bulbs? _____
3. What is the total wattage of all bulbs in your home? _____
4. What temperature does your family set your thermostat set at in the winter? _____
   Summer? _____
5. Is your home properly insulated to help keep the house warm in the winter and cool in the summer? _____
6. What locations in the house should be insulated the most? _____

   _____

   _____
7. Does your family wait until there is a full load of laundry to wash clothes? _____
8. Do you dry washed clothes outside or use a clothes dryer? _____
9. How many miles per gallon does your family's car get? _____
10. How many gallons of gas does your car use in a week? _____
11. What kind of gas does your family use in their car? _____
12. How often do you walk, ride your bike, or use public transportation instead of riding in a car per month? _____

STUDENT WORKSHEET 2

HOW GREEN ARE WE?

SCHOOL AUDIT

1. How long do the lights stay on in the school after the students have left for the day? _____
2. Who is responsible for turning off the lights? _____
3. Do you ever see the lights turned on in the evening hours? _____
4. What kinds of light bulbs are used in the lighting fixtures at the school? _____
5. Are the windows in the school properly insulated? (Find this out by holding a piece of tissue paper or a ribbon next to the windows. If it moves, there is probably a draft, which means that cold air is getting in and the school's furnace has to use more electricity to keep the school warm.) _____
6. What are ways to fix the windows? _____

   _____
7. Who is responsible for getting this done? _____
8. How do you and your friends get to school each day? _____
9. Does the bus system reach enough students so that no one has to rely on other transportation? _____
10. If a parent drives you, do other students ride with you? _____
11. What alternate modes of energy-efficient transportation could students use to get to school?

    _____
12. Can you make arrangements to pick up a friend or several friends to ride to and from school with you and your parents? _____
13. How do most teachers and other school personnel (such as the principal, teachers, or your guidance counselor) get to school each day? _____
14. What other forms of transportation would you suggest them to use for getting to and from school each day? _____
15. Do you see parents picking up children from school? _____
16. If so, do they leave their car running while they wait? _____
17. What measures could the school take to discourage drivers from doing this? _____

    _____

STUDENT WORKSHEET 3

HOW GREEN ARE WE?

COMMUNITY AUDIT

1. What industries in your community are major polluters? _____

   _____

2. What federal regulations that relate to air pollution affect their business? _____

   _____

   Do they abide by these regulations? _____

   If not, why? _____

3. What local regulations affect their business? _____

4. What other businesses in your community indirectly contribute to air pollution? _____

   _____

5. What measures do these companies take to cut down on air pollution? _____

   _____

6. Are there enough buses and subways to help people get around town easily without having to get into their car? _____

   Could the routes be changed to accommodate more people? _____

7. Do major streets have bicycle lanes to make it easier for people to ride bikes as an alternative to driving their car? _____

8. Does the community sponsor a car pool program? _____

   How many people are participating? _____

9. Do the major roads in your community encourage carpooling by designating High-Occupancy Vehicle (HOV) lanes during rush hour? _____

10. Are traffic signals timed to reduce the amount of time that cars sit at lights? _____

11. Are gas stations required to install special devices on pumps to capture gas fumes that can be released into the atmosphere, causing air pollution? _____

12. Does your community require emissions inspections for all registered vehicles? _____

    How often are these inspections required? _____

WORKSHEET 5 (SCHOOL)

WORKSHEET 6 (HOME)